

10/562607

IAP20 Rec'd PCT/PTO 28 DEC 2005

PATENT CLAIMS

- 5 1. System comprising at least one effector and at least one receptor modified elastomer, characterized in that a change in volume is effected upon bringing into contact the at least one effector with the at least one receptor modified elastomer by means of forming a selective, non-covalent or covalent bond between the receptors and the at least one effector of the receptor-modified elastomer.
- 10 2. System according to claim 1, characterized in that the change in volume is reversible or, also, non-reversible.
- 15 3. System according to claim 1 or claim 2, characterized in that the receptors of the at least one receptor-modified elastomer and the at least one effector are complementary with respect to each other.
- 20 4. System according to any one of the preceding claims, characterized in that the volume change of one and the same elastomer in an acidic and in a alkaline medium is a volume enlargement, respectively.
- 25 5. System according to any one of the preceding claims, characterized in that the at least one effector comprises a liquid or a gas or a liquid and a gas as a medium, in which the elastomer is non-soluble.
- 30 6. System according to any one of the preceding claims, characterized in that the effector comprises compounds that are selected from the group comprising anorganic acids, carboxylic acids, amines, vicinal amines, polyamines, amino acids, peptides, nucleosides, nucleotides, nucleic acids, biogenic effectors, steroids, Lewis acids, Lewis bases; alkaline, earth alkaline and transition metal cations; anions, or mixtures of two or more thereof.

7. System according to any one of the preceding claims, characterized in that the elastomers comprise as receptors residues of compounds that are selected from the group comprising amines, polyamines, acids, crown ethers, cryptands, spherands, polyalkyleneglycol ether, polyamides, lactames, imides, urea, guanidines, aromatic/heteroaromatic compounds, calixarenes, resorcinarenes, cyclophanes, paracyclophanes, rotaxanes, catenanes, polyrotaxanes, polycatenanes, cavitands, cyclohexatrylenes, cyclodextrins, peptides, proteins, metal complexes or mixtures of two or more thereof, as well as biogenic receptors or parts thereof, including proteins and nucleic acids.
8. System according to any one of the preceding claims, characterized in that, upon bringing into contact with the at least one effector, in addition to the volume, the optical properties of the receptor modified elastomer change as well.
9. System according to any one of the preceding claims, characterized in that it is manufactured according to a process comprising at least one of steps (i) or (j):
- (i) reacting at least one functionalized polymer with at least one receptor,
 - (j) reacting at least one functionalized monomer with at least one receptor and subsequently reacting the at least one receptor-modified monomer obtained thereby to arrive at a polymer.
10. System according to claim 9, characterized in that the functional polymers or monomers contain (functional) groups selected from the group comprising one or more of the (functional) groups -OH, -NRH, -NH₂, -COOH, -COOR, -CONH₂, -CONHR, -SH, -CN, -SCN, -NCS, -C₆H₄-CH₂X (X = OH, -NRH, -NH₂, Cl, Br), -OP(O)(OR)₂, -OSO₂ (OR), wherein R means a hydrogen-, aryl-, heteroaryl- or alkyl-residue.
11. System according to claim 10, characterized in that the reaction of step (i) is performed in homogenous, heterogeneous or a microdisperse phase.
12. System according to claim 11, characterized in that the reaction is performed in a solvent selected from the group comprising dimethyl sulfoxide, dimethyl formamide, dimethyl acet-

amide, nitromethane, tetrahydrofurane, methyl-t-butylether, sulfolan, or mixtures of two or more thereof.

- 5 13. Process for manufacturing a system as defined in any one of the preceding claims, characterized in that the process comprises the bringing into contact of the at least one effector with the receptor-modified elastomer.
- 10 14. Use of a system according to any one of the claims 1 to 12 or use of a system manufactured according to claim 13 for flow control, as an actuator, as a sensor or as a sensor array, for setting free or taking up active ingredients, as a sealing material.
- 15 15. Element for flow control or as a actuator for performing mechanical movements or as a sensor for chemical, mechanical, electrical, electromechanical, magnetic or optical signals or as a sensor array or device for setting free active ingredients or taking up active ingredients, or for sealing, comprising a system according to any one of claims 1 to 12 or a system manufactured according to claim 13.